MIDNIGHT AT MID-MORNING

"Th[e] black core [of smoke from burning oil wells] completely obscured the sun, making it look like midnight at mid-morning."

Thus reported a United Nations mission sent to Kuwait to assess the scope and nature of the damage inflicted on the country's infrastructure during the Iraqi occupation. The mission, led by former UN Under-Secretary-General Abdulrahim A. Farah, visited Kuwait from 18 March to 4 April.

The first reports of oil wells ablaze in Kuwait came in late January 1991. Later on, news reports suggested that just before 24 February 1991, in the midst of the hostilities, about 150 wells were ignited. This was followed by reports that between 500 and 600 wells had been set afire. In March, millions of barrels of oil were reported to be burning off each day at some 500 oil wells.

Kuwait Oil Company officials concluded that Iraqi soldiers had set explosives around the mouth of every oil well in the country immediately after the invasion, but did not prime or detonate the charges until two or three days before the Iraqi forces withdrew.

The UN mission estimated that the number of burning oil wells may have been about 700 at its maximum. Some had started to cone and go out and others were being put out by fire fighters. The amount of oil burned was commonly thought to be between 2 million and 6 million barrels per day.

"The unprecedented catastrophe of hundreds of burning and gushing oil wells and the consequent pollution . . . overshadows the damage sustained by the rest of the [oil] industry," the mission reported.

"The deliberate torching of the oilfields represents Kuwait's most pressing environmental problem of today, beside which all else pales into insignificance. There has never been anything like it in history. . ."

UNITED NATIONS

BLACK CLOUDS

Each oilfield was producing its own emission cloud, mainly of particulates (including soot) and combustion gases, the mission reported.

There were three basic smoke plumes, each made up of emissions from many well fires. On 24 March, one plume was about 5 kilometres wide. Another very dense black cloud was about 15 kilometres wide, with an inner, very black core about 5 kilometres wide that completely obscured the sun. Over the oilfields, the emission plume could be almost on the ground, depending on the wind.

Normally, the lower plume boundary was, over Kuwait, some 70 to 150 metres above the ground. The plumes gradually rose as distance from the wells increased. Plumes over the central Gulf area seemed to have a lower level of about 1,300 metres and an upper level of about 2,500 metres.

The smoke plumes cast their pall over many other Gulf States. Smoke layers from Kuwait's fires were observed in Bahrain and over the Islamic Republic of Iran, depending on wind direction.

Eventually, the smoke plume would be dispersed by weather, with the particulates falling or being washed out by rain, the mission reported.

Measurements of the contaminant content of the air suggested that there had been an increase in levels of sulphur compounds, carbon monoxide and total hydrocarbons, said a report of the UN Environment Programme. The southern oilfields are known to produce hydrogen sulphite and sulphur dioxide.

IMPACT ON CLIMATE

"Global climate change effects of the magnitude envisaged by some scientists are . . . unlikely," the mission stated. "Climatic effects will most likely be confined to the region, and more locally in Kuwait, where the sun-shield effects of the smoke clouds

are more pronounced. When the plumes are at their most dense, sunlight does not penetrate and so is unable to heat the land in a normal fashion.

"Sandy desert areas do not retain heat for very long, so that a few days of heavy smoke cover leads to appreciable local cooling beneath the cloud—perhaps 10 degrees Celsius or more. This is a temporary phenomenon: when the plume swings away, the land heats again and... temperature eventually rises. Kuwait authorities suggested that local air temperature lowering may have delayed the onset of spring flowering by as much as four weeks in many areas."

It was more difficult to assess other possible damage, the mission reported. "Particulates from fires have been deposited on both land and sea over wide areas. In the Persian Gulf... they form a surface skin, which wind and currents shape into whorls and kilometre-long strands that resemble oil-slicks. The effects and consequences of these carbon deposits on the sea are not known. On land, the particles cover the ground surface and plants. In the proximity of well fields, this is mixed with unburnt oil given off as a fine spray."

Nothing was known about the composition of these particles at the time of the mission, and it was not possible to assess the health and environmental consequences of these deposits. The long-term consequences of this surface deposition are also unknown, including its effect on groundwater quality and on the soil seedbank.

UN ACTION

United Nations experts meeting in Geneva in February 1991 felt that emissions from burning oil wells, such as soot and other products of combustion, could have measurable negative effects on health and the environment, not only in the immediate area, but also downwind, especially by reducing solar radiation and increasing rain acidity.

The experts were meeting at a consultation convened by the UN Environment Programme (UNEP). They expressed extreme concern about the immediate and long-term threats to the environment arising from the hostilities in an ecologically fragile region that supports some 10 million people.

At a second consultation held in March at Geneva, UNEP set up a task force to carry out a 90-day in-depth survey and assessment of environmental damage in the Gulf region.

The assessment is to include the atmosphere, and involve examination of air quality, air-sea interaction and long-range transport of contaminants.

Between 30 and 40 experts will carry out the initial surveys and assessments leading to an action plan that will seek to mitigate or eliminate the consequences of the environmental damage. A core team of experts visited Kuwait in April.

The cost of the task force was estimated at $3.5 million. Japan was the first donor, announcing at the end of March a $1.11 million contribution. The Netherlands made available in July a contribution of $500,000.

Norway announced at the end of April a $1 million contribution, to be used to acquire data on the nature and content of the emissions from Kuwait's burning wells.

Assistance will go to refurbish three fixed air quality monitoring stations already in Kuwait, and to purchase self-propelled mobile air quality monitoring stations to be moved about Kuwait. The mobile stations will be used to monitor such substances as sulphur dioxide, hydrogen sulphide, carbon monoxide, carbon dioxide, ozone and hydrocarbons. Air and particulate samples will be examined at laboratories outside Kuwait.

"The most pressing and immediate need, as a result of the Iraq-Kuwait conflict, is in precisely this area," said Michael Gwynne, Director of UNEP's Global Environment Monitoring System, when Norway announced its pledge.

In July 1991, the UN core team in Kuwait reported that, as of 14 July, 200 wells had been capped.

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